

REMARKS

Claims 1, 4-7, 10-13 and 16-20 are pending in the present application. All claims stand rejected in the Office Action of June 18, 2003. The Examiner's reconsideration is respectfully requested in view of the amendments made hereinabove, taken with the following remarks.

Double Patenting

Claims 1, 4-7, 10-13 and 16-20 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-16 of U.S. Patent No. 6,258,317 (hereinafter the '317 patent). The Examiner notes that although the conflicting claims are not identical, they are not patentably distinct from each other because the alloy compositions in the instant claims are overlapped by the alloy compositions of the '317 patent. Upon allowance of the presently pending claims, Applicants may submit a Terminal Disclaimer in the present case to obviate the rejection of obviousness-type double patenting, if required.

Claim Rejections - 35 U.S.C. §103(a)

Claims 1, 4-7, 10-13 and 16-20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 3,015,558 to Grant et al.

Independent claims 1, 7 and 13 have been amended herein to define the upper chromium content as limited at 26 wt.%. Support for this amended upper limit of 26 wt.% for chromium is found in Table I, page 5 of the instant application, under the column captioned "Nominal Range". Hence, no new matter has been added.

The Present Invention

The present invention is directed to a nickel base alloy which provides high temperature and high strength in applications involving corrosion-inducing environments over a complete spectrum of carburizing, oxidizing, nitriding and sulfidizing atmospheres. When optimum levels of chromium, aluminum, nitrogen and critical microalloying levels of yttrium and zirconium are present in the alloy, outstanding corrosion resistance will be

achieved in this complete spectrum of carburizing, oxidizing, nitriding and sulfidizing corrosion-inducing environments. That feature is present in all of the pending claims.

As pointed out on page 3, lines 30-32 of the instant specification, maximum overall corrosion resistance to carburizing, oxidizing, nitriding and sulfidizing environments is achieved by a combination of alloy constituents containing at least 2.75 wt.% Al, 0.01 wt.% Zr and 0.01 wt.% Y along with the optimum amount of chromium. The addition of 0.01-0.1 wt.% N further optimizes oxidation resistance. These limitations are present in all pending claims.

An addition of 21.5-26 wt.% chromium as required in claim 1 imparts oxidation resistance to the alloy. Chromium levels less than 21.5 wt.% are inadequate for oxidation resistance, while higher levels of chromium of greater than 28 wt.% can produce detrimental chromium-containing precipitates. The instant specification points out that an addition of 4.5-9.5 wt.% molybdenum contributes to stress corrosion cracking resistance and contributes solid solution strengthening to the matrix of the material. Aluminum in an amount ranging from 2-3.5 wt.% contributes to oxidation resistance and precipitates as γ' phase to strengthen the matrix at intermediate temperatures. As pointed out above, aluminum contents of at least 2.75 wt.% provide maximum oxidation resistance.

It is also critical in the present invention for sulfidization resistance that the alloy contain a minimum of 0.01 wt.% zirconium to stabilize the scale against inward migration of sulfur through its protective layer. Zirconium additions above 0.6 wt.% adversely impact the alloy's fabricability. Advantageously, an addition of at least 0.005 wt.% and, more preferably, at least 0.01 wt.% yttrium improves both oxidation and nitridation resistance of the alloy and is critical to establish carburization resistance. The present specification further points out that yttrium levels above 0.1 wt.% increase the cost and decrease the hot workability of the alloy. When the claimed optimum levels of chromium, aluminum and critical microalloying levels of yttrium and zirconium are present, the balanced outstanding corrosion resistance is achieved and corrosion resistance in the complete spectrum of carburizing, oxidizing, nitriding and sulfidizing environments is obtained. See page 3 of the specification at lines 24-27. Clearly, no such combination of properties or critical ranges is taught or suggested in any of the cited prior art.

Grant et al. - U.S. Patent No. 3,015,558

Grant et al. (col. 2, lines 5-54) has been applied in rejecting all of the pending claims under 35 U.S.C. §103.

In support of this rejection, applying Grant et al., the Examiner states in Paragraphs 6 & 7 of the Office Action of June 18, 2003:

“6. The cited references (*sic*) disclose the features substantially as claimed. The disclosed features include the claimed Ni-Cr-Co alloy. Therefore, the subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the subject matter disclosed by the reference. An obviousness rejection based on similarity in chemical structure and function entails the motivation of one skilled in the art to make a claimed compound, in the expectation that compounds similar in structure will have similar properties. *In re Gyurik*, 596 F.2d 1012, 1018, 201 USPQ 552, 557 (CCPA 1979); See *In re May*, 574 F.2d 1082, 1094, 197 USPQ 601, 611 (CCPA 1978) and *In re Hoch*, 57 CCPA 1292, 1296, 428 F.2d 1341, 1344, 166 USPQ 406, 409 (1970). Therefore, the subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the subject matter disclosed by the reference. Overlapping ranges have been held to be a *prima facie* case of obviousness. See *In re Malagari*, 499 F.2d 1297, 1303, 182 USPQ 549, 553 (CCPA 1974).”

7. Grant teaches about 28-45 wt.% Cr which is about the same as claimed Cr contents. See *In re Ayers*, 154 F.2d 182, 69 USPQ 109 (CCPA 1946). Moreover, it is well settled that a *prima facie* case of obviousness would exist where the claimed ranges and prior art do not overlap but are close enough that one skilled in the art would have expected them to have the same properties, *In re Titanium Metals Corporation of America v. Banner*, 227 USPQ 773 (Fed.Cir. 1985), *In re Woodruff*, 16 USPQ 2d 1934, and *In re Aller*, 105 USPQ 233.” [Emphasis added]

The Examiner states, *inter alia*, that it would have been obvious to have selected the overlapping portion of the subject matter disclosed by Grant et al. Applicants' independent claims 1, 7, 13 and 20 define specific numeric ranges (>0) for ten alloy constituents: Ni, Cr, Co, Mo, Al, Ti, Y, Zr, C and N. Grant et al. broadly disclose that only Ni, Cr and Al be present, with a preferred composition of “about 30 to 40% chromium, about 2 to 5% aluminum and the balance substantially nickel.” Col. 2, lines 24-26. The balance of the elements disclosed by Grant et al. are all optional.

To select the “overlapping portions” of Grant et al. necessary to meet the present claims would require (1) the selection of seven alloy constituents from the list of optional additions, *viz.*, Co, Mo, Ti, Y, Zr, C and N, (2) the selection of wt.% amounts of

those optional additions falling within the claimed ranges, and (3) the modification of the non-overlapping Cr content of Grant et al. and the concurrent adjustment of Ni content to meet the presently claimed ranges and therein provide the properties desired, namely, resistance to carburizing, oxidizing, nitriding and sulfidizing environments.

It is submitted that the Examiner has employed improper hindsight in picking and choosing the various optional elements broadly disclosed by Grant et al. and then placing the wt.% amounts of each within Applicants' claimed ranges. Furthermore, there is absolutely no overlap in the Cr ranges of Grant et al. and Applicants' amended claims.

The law is clear that in order to modify a prior art reference, the prior art must also supply the motivation to make the modification to arrive at the claimed structure, *In re Jones*, 21 USPQ2d 1941, 1944 (Fed.Cir. 1992). A more recent case held that the motivating suggestion in the prior art to motivate one of ordinary skill to combine elements so as to create the same invention must be explicit, see *Winner International Royalty Corp. v. Wang*, 48 USPQ2d 1139, at 1140 and at 1144 (D.C.D.C. 1998).

There is no explicit motivation found in Grant et al. to select from the extensive list of optional elements the specifically claimed elements and wt.% ranges in order to provide an alloy which exhibits resistance to carburizing, oxidizing, nitriding and sulfidizing environments. Grant et al. teaches a "broadly stated range of compositions" that produces three types of alloys, i.e., Types I, II and III, col. 2, lines 55-72. Type I is said to exhibit fast aging response; Type II is said to have a delayed aging response and is resistant to oxidation; and Type III is sluggish with respect to aging but is said to be hardenable at higher aging temperatures, col. 2, lines 59-69.

Grant et al. is thus directed to age hardenable, aluminum containing, high chromium nickel alloys, column 1, lines 10-13. Of the three alloy types I-III disclosed in Grant et al., only alloy Type II mentions resistance to oxidation, col. 7, lines 24-25. Grant et al. teaches nothing about alloys resistant to carburizing, nitriding and sulfidizing environments, and, hence, does not provide any motivation to pick and choose from the list of various optional elements to arrive at the claimed composition and the desired properties set forth in the claims. Indeed, none of the many specific alloy examples of Grant et al. disclosed in Table I (Type I alloys), Table IV (Type II alloys) or Table VI (Type III alloys) contains the specific alloy constituents required in the present claims, and where certain of the claimed elements are present in Grant et al.'s examples, they are not within the claimed ranges. For example: In Table I of Grant et al., the Cr ranges from 30 to 45% and there is no

Y, Zr, Co, C or N; in Table IV the examples all contain 40% Cr and no Co, Y, Mo, Ti, Zr, C or N; and in Table VI there is no Zr, Y, C or N.

It is clear that Grant et al. provides no suggestion or motivation to modify the “broadly stated range of composition”, col. 2, lines 55-56, to select the ten specific elements required in the present independent claims so as to provide an alloy with the claimed properties, i.e., one which is resistant to carburizing, oxidizing, nitriding and sulfidizing environments. As such, the present claims clearly represent an unobvious and patentable advance over Grant et al. The mere fact that the prior art may be modified to meet the claimed invention does not make the modification obvious unless the prior art suggested the desirability of the modification, *In re Fritch*, 23 USPQ2d 1780 (Fed.Cir. 1992).

Applicants also continue to urge that the claimed Cr ranges of 21.5 or 22 to 26 wt.% Cr do not overlap with Grant et al.’s broad disclosure of “about 28-45% Cr” or his preferred range of “about 30-40% Cr”. The Examiner continues to rely upon the *In re Ayers* decision, 69 USPQ 109 (CCPA 1946) wherein the claim limitation as well as the prior art at issue contained the word “about” and the court stated:

“The term ‘about’ as used in the appealed claim evidently permits of some tolerance and ... does not seem to us to be a modification critical in character.” 69 USPQ 109, 112. [Emphasis supplied]

The present claims do not contain the modifier “about” and, therefore, are limited to a maximum of 26% Cr. In addition, the use of the modifier “about” by Grant et al. would not fairly extend the range of 28 to 45% Cr or 30 to 40% Cr to include a range of 21.5 or 22 to 26% Cr, particularly when taken with all of the specific alloy examples set forth in Grant et al. In those examples, only one alloy is at 28% Cr while the vast majority are much higher in Cr content. There is no Cr overlap. It is clear that Grant et al. teaches away from the claimed Cr range and would lead persons skilled in the art to use Cr in amounts outside of the claimed ranges.

The Examiner states that: “... a *prima facie* case of obviousness would exist where the claimed ranges and prior art do not overlap but are close enough that one skilled in the art would expect them to have the same properties, citing *Titanium Metals Corporation of America v. Banner*, 227 USPQ 773 (Fed.Cir. 1985) and others.

The Examiner’s statement appears to be made in relation to only the Cr content of the alloys. The statement ignores the fact that the claims also require critical amounts of seven other alloying additions, particularly Y and Zr. The *Titanium Metals* case

dealt with a simple ternary alloy of Ti, Mo and Ni of specified ranges. The prior art included a Russian publication which disclosed several alloys which fell squarely within the scope of claims 1 and 2 and which were almost identical with the Ni, Mo and Ti contents of claim 3. The court's statement "The proportions are so close ..." thus concerned the relative amounts of Ni, Mo and Ti set forth in claim 3 and in the prior art. In other words, all of the three claimed elements were also present in the prior art Russian publication in very close wt.% so that one would logically expect them to have the same properties. That is not the case here. The Cr content is but only one of the claimed constituents and the law of *Titanium Metals* is inapplicable unless the prior art discloses an alloy that expressly contains the critically required elements. Grant et al. fails to disclose or suggest such an alloy, hence, the proximity of the Cr ranges cannot be at issue.

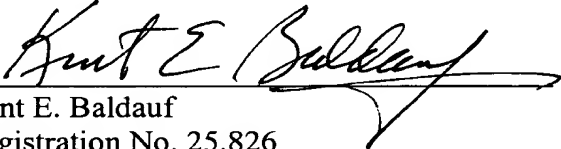
In light of the amendments made herein, taken with the foregoing remarks, it is submitted that claims 1, 4-7, 10-13 and 16-20 represent a patentable advance over the prior art. The Examiner's reconsideration and favorable action are respectfully requested.

Respectfully submitted,

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